

WHAT IS CLAIMED IS:

1. A system for controlling opening of a throttle valve installed at an air intake system of an internal combustion engine mounted on a vehicle, comprising:

a throttle opening sensor for detecting opening of the throttle valve;

5        operating condition detecting means for detecting operating conditions of the vehicle;

learning-controlling means for learning-controlling a fully-closed value of the opening of the throttle valve based on the detected opening of the throttle valve to update the learned fully-closed value, when operating state of the vehicle is under a  
10       prescribed operating state; and

updating inhibiting means for inhibiting next updating of the learned fully-closed value by the learning-controlling means in valve opening direction after the learned fully-closed value has once been updated in the valve opening direction, until the operating state of the vehicle moves outside the prescribed operating state and then  
15       again returns to the prescribed operating state.

2. A system according to claim 1, wherein the prescribed operating state is a state under which a vehicle operator rides on an accelerator pedal.

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3. A system for controlling opening of a throttle valve installed at an air intake system of an internal combustion engine mounted on a vehicle, comprising:

a throttle opening sensor for detecting opening of the throttle valve;

25        operating condition detecting means for detecting operating conditions of the vehicle; and

learning-controlling means for learning-controlling a fully-closed value of the opening of the throttle valve based on the detected opening of the throttle valve to

update the learned fully-closed value, when operating state of the vehicle is under a prescribed operating state;

wherein the learning-controlling means updates the learned fully-closed value to the detected throttle opening when the detected throttle opening is smaller than the learned fully-closed value, while updating the learned fully-closed value in the valve opening direction by a predetermined amount when the detected throttle opening is greater than the learned fully-closed value.

4. A system according to claim 3, wherein the prescribed operating state is a state under which a vehicle operator rides on an accelerator pedal.

5. A system for controlling opening of a throttle valve installed at an air intake system of an internal combustion engine mounted on a vehicle, comprising:

a throttle opening sensor for detecting opening of the throttle valve;  
operating condition detecting means for detecting operating conditions of the vehicle;  
and

learning-controlling means for learning-controlling a fully-closed value of the opening of the throttle valve based on the detected opening of the throttle valve to update the learned fully-closed value, when operating state of the vehicle is under a prescribed operating state;

wherein the learning-controlling means updates the learned fully-closed value in a valve closing direction by a first prescribed amount when the detected throttle opening is smaller than the learned fully-closed value, while updating the learned fully-closed value in the valve opening direction by a second prescribed amount when the detected throttle opening is greater than the learned fully-closed value.

6. A system according to claim 5, wherein the prescribed operating state is a state under which a vehicle operator rides on an accelerator pedal.

5           7. A system according to claim 5, wherein the second prescribed amount is smaller than the first prescribed amount.

8. A system according to claim 5, wherein the second prescribed amount is set to  
10 a minimum unit value in controlling the opening of the throttle valve.

9. A method of controlling opening of a throttle valve installed at an air intake system of an internal combustion engine mounted on a vehicle, comprising the steps  
15 of:

detecting opening of the throttle valve;

detecting operating conditions of the vehicle;

learning-controlling a fully-closed value of the opening of the throttle valve based on the detected opening of the throttle valve to update the learned fully-closed  
20 value, when operating state of the vehicle is under a prescribed operating state; and

inhibiting next updating of the learned fully-closed value in valve opening direction after the learned fully-closed value has once been updated in the valve opening direction, until the operating state of the vehicle moves outside the prescribed operating state and then again returns to the prescribed operating state.

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10. A method according to claim 9, wherein the prescribed operating state is a state under which a vehicle operator rides on an accelerator pedal.

11. A method of controlling opening of a throttle valve installed at an air intake system of an internal combustion engine mounted on a vehicle, comprising the steps of:

detecting opening of the throttle valve;

5 detecting operating conditions of the vehicle; and

learning-controlling a fully-closed value of the opening of the throttle valve based on the detected opening of the throttle valve to update the learned fully-closed value, when operating state of the vehicle is under a prescribed operating state;

wherein the step of learning-controlling updates the learned fully-closed value to  
10 the detected throttle opening when the detected throttle opening is smaller than the learned fully-closed value, while updating the learned fully-closed value in the valve opening direction by a predetermined amount when the detected throttle opening is greater than the learned fully-closed value.

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12. A method according to claim 11, wherein the prescribed operating state is a state under which a vehicle operator rides on an accelerator pedal.

20 13. A method of controlling opening of a throttle valve installed at an air intake system of an internal combustion engine mounted on a vehicle, comprising the steps of:

detecting opening of the throttle valve;

detecting operating conditions of the vehicle; and

25 learning-controlling a fully-closed value of the opening of the throttle valve based on the detected opening of the throttle valve to update the learned fully-closed value, when operating state of the vehicle is under a prescribed operating state;

wherein the step of learning-controlling updates the learned fully-closed value in

a valve closing direction by a first prescribed amount when the detected throttle opening is smaller than the learned fully-closed value, while updating the learned fully-closed value in the valve opening direction by a second prescribed amount when the detected throttle opening is greater than the learned fully-closed value.

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14. A method according to claim 13, wherein the prescribed operating state is a state under which a vehicle operator rides on an accelerator pedal.

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15. A method according to claim 13, wherein the second prescribed amount is smaller than the first prescribed amount.

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16. A method according to claim 13, wherein the second prescribed amount is set to a minimum unit value in controlling the opening of the throttle valve.

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17. A computer program embodied on a computer-readable medium for controlling opening of a throttle valve installed at an air intake system of an internal combustion engine mounted on a vehicle, comprising the steps of:

detecting opening of the throttle valve;

detecting operating conditions of the vehicle;

25 learning-controlling a fully-closed value of the opening of the throttle valve based on the detected opening of the throttle valve to update the learned fully-closed value, when operating state of the vehicle is under a prescribed operating state; and

inhibiting next updating of the learned fully-closed value in valve opening direction after the learned fully-closed value has once been updated in the valve

opening direction, until the operating state of the vehicle moves outside the prescribed operating state and then again returns to the prescribed operating state.

5           18. A computer program embodied on a computer-readable medium for controlling opening of a throttle valve installed at an air intake system of an internal combustion engine mounted on a vehicle, comprising the steps of:

          detecting opening of the throttle valve;

          detecting operating conditions of the vehicle; and

10          learning-controlling a fully-closed value of the opening of the throttle valve based on the detected opening of the throttle valve to update the learned fully-closed value, when operating state of the vehicle is under a prescribed operating state;

          wherein the step of learning-controlling updates the learned fully-closed value to the detected throttle opening when the detected throttle opening is smaller than the  
15          learned fully-closed value, while updating the learned fully-closed value in the valve opening direction by a predetermined amount when the detected throttle opening is greater than the learned fully-closed value.

20           19. A computer program embodied on a computer-readable medium for controlling opening of a throttle valve installed at an air intake system of an internal combustion engine mounted on a vehicle, comprising the steps of:

          detecting opening of the throttle valve;

          detecting operating conditions of the vehicle; and

25          learning-controlling a fully-closed value of the opening of the throttle valve based on the detected opening of the throttle valve to update the learned fully-closed value, when operating state of the vehicle is under a prescribed operating state;

          wherein the step of learning-controlling updates the learned fully-closed value in

a valve closing direction by a first prescribed amount when the detected throttle opening is smaller than the learned fully-closed value, while updating the learned fully-closed value in the valve opening direction by a prescribed second amount when the detected throttle opening is greater than the learned fully-closed value.

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